BROOKHAVEN NATIONAL LABORATORY

Work Permit # DRL-2012-001
Work Order # _____
Job# _____ Activity# _____

1. Work requester fills out this section. ☐ **Standing Work Permit**

Requester: Don Lynch	Date: 01/17/2012	Ext.: 2253	Dept/Div/Group: PO/PHENIX
Other Contact person (if different from requester): Carter Biggs			Ext.: 7515
Work Control Coordinator: Don Lynch		Start Date: 01/17/2012	Est. End Date: 02/15/2012
Brief Description of Work: Repair leaks and troubleshoot repair electronics on DC east and West			
Building: 1008	Room: IR	Equipment: DC East & West detectors	Service Provider: PHENIX DC experts & PHENIX Technicians

. WCC, Requester/Designee, Service Provider, and ES&H (as necessary) fill out this section or attach analysis

ES&H ANALYSIS				
Radiation Concerns	☒ None	☐ Activation	☐ Airborne	☐ Contamination	☐ Radiation
Radiation Generating Devices:	☐ Radiography	☐ Moisture Density Gauges	☐ Soil Density Gauges	☐ X-ray Equipment
☐ Special nuclear materials involved, notify Isotope Special Materials Group			☐ Fissionable materials involved, notify Laboratory Criticality Officer	
Safety Concerns	☐ None	☐ Ergonomics	☐ Transport of Haz/Rad Material	
☐ Adding/Removing Walls or Roofs	☐ Confined Space*	☐ Explosives	☐ Lead*	☐ Penetrating Fire Walls
	☐ Corrosive	☐ Flammable	☐ Magnetic Field*	☐ Pressurized Systems
☐ Asbestos*	☐ Cryogenic	☐ Fumes/Mist/Dust*	☐ Material Handling	☐ Rigging/Critical Lift
☐ Beryllium*	☐ Electrical	☐ Heat/Cold Stress	☐ Noise*	☐ Toxic Materials*
☐ Biohazard*	☒ Elevated Work*	☐ Hydraulic	☐ Non-ionizing Radiation*	☐ Vacuum
☐ Chemicals*	☐ Excavation	☐ Lasers*	☐ Oxygen Deficiency*	☒ Other Purge Flammable Gas Prior to repair procedure
* Does this work require medical clearance or surveillance from the Occupational Medicine Clinic? ☐ Yes ☒ No				
Environmental Concerns		☒ None	☐ Work impacts Environmental Permit No.	
☐ Atmospheric Discharges (rad/non-rad)		☐ Land Use	☐ Soil Activation/contamination	☐ Waste-Mixed
☐ Chemical or Rad Material Storage or Use		☐ Liquid Discharges	☐ Waste-Clean	☐ Waste-Radioactive
☐ Cesspools (UIC)		☐ Oil/PCB Management	☐ Waste-Hazardous	☐ Waste-Regulated Medical
☐ High water/power consumption		☐ Spill potential	☐ Waste-Industrial	☐ Underground Duct/Piping
Waste disposition by:				☐ Other
Pollution Prevention (P2)/Waste Minimization Opportunity:		☒ None ☐ Yes		
FACILITY CONCERNS	☒ None			
☐ Access/Egress Limitations	☐ Electrical Noise	☐ Potential to Cause a False Alarm		☐ Vibrations
	☐ Impacts Facility Use Agreement		☐ Temperature Change	☐ Other
☐ Configuration Control	☐ Maintenance Work on Ventilation Systems		☐ Utility Interruptions	
WORK CONTROLS				
Work Practices				
☐ None	☐ Exhaust Ventilation	☒ Lockout/Tagout	☐ Spill Containment	☐ Security (see Instruction Sheet)
☒ Back-up Person/Watch	☐ HP Coverage	☐ Posting/Warning Signs	☐ Time Limitation	☐ Other
☐ Barricades	☐ IH Survey	☐ Scaffolding-requires inspection	☐ Warning Alarm (i.e. "high level")	
Protective Equipment				
☐ None	☐ Ear Plugs	☐ Gloves	☐ Lab Coat	☐ Safety Glasses
☐ Coveralls	☐ Ear Muffs	☐ Goggles	☐ Respirator	☐ Safety Harness
☐ Disposable Clothing	☐ Face Shield	☐ Hard Hat	☐ Shoe Covers	☒ Safety Shoes ☐ Other
Permits Required (Permits must be valid when job is scheduled.)				
☒ None	☐ Cutting/Welding	☐ Impair Fire Protection Systems		
☐ Concrete/Masonry Penetration	☐ Digging/Core Drilling	☐ Rad Work Permit-RWP No		
☐ Confined Space Entry	☐ Electrical Working Hot	☐ Other		
Dosimetry/Monitoring				
☒ None	☐ Heat Stress Monitor	☐ Real Time Monitor	☐ TLD	
☐ Air Effluent	☐ Noise Survey/Dosimeter	☐ Self-reading Pencil Dosimeter	☐ Waste Characterization	
☐ Ground Water	☐ O_2/Combustible Gas	☐ Self-reading Digital Dosimeter	☐ Other	
☐ Liquid Effluent	☐ Passive Vapor Monitor	☐ Sorbent Tube/Filter Pump		
Training Requirements (List below specific training requirements)				
PHENIX Awareness, LockOut/TagOut affected, RHIC Access, working at heights, PHENIX Awareness				
Based on analysis above, the Walkdown Team determines the risk, complexity, and coordination ratings below:			**If using the permit when all hazard ratings are low, only the following need to sign: (Although allowed, there is no need to use back of form)**	
ES&H Risk Level:	☒ Low ☐ Moderate ☐ High		WCC:	Date:
Complexity Level:	☒ Low ☐ Moderate ☐ High		Service Provider:	Date:
Work Coordination:	☒ Low ☐ Moderate ☐ High		Authorization to start	Date:

	(Departmental Sup/WCC/Designee)

3. Both work requester and service provider contribute to work plan (use attachments for detailed plans)

Work Plan (procedures, timing, equipment, and personnel availability need to be addressed): See Attached	
Special Working Conditions Required: No	
Operational Limits Imposed: No	
Post Work Testing Required: No	
Job Safety Analysis Required: ☐ Yes ☒ No	Walkdown Required: ☒ Yes ☐ No

Reviewed by: Primary Reviewer will determine the size of the review team and the other signatures required based on hazards and job complexity. Primary Reviewer signature means that the hazards and risks that could impact ES&H have been identified and will be controlled according to BNL requirements.

Title	Name (print)	Signature	Life #	Date
Primary Reviewer				
ES&H Professional				
Other				
Other				
Work Control Coordinator	Don Lynch		20146	
Service Provider				
	Review Done: ☐ in series	☐ team		

4. Job site personnel fill out this section.

Note: Signature indicates personnel performing work have read and understand the hazards and permit requirements (including any attachments).			
Job Supervisor:		Contractor Supervisor:	
Workers:	Life#:	Workers :	Life#:
Workers are encouraged to provide feedback on ES&H concerns or on ideas for improved job work flow. Use feedback form or space below.			

5. Departmental Job Supervisor, Work Control Coordinator/Designee

Conditions are appropriate to start work: (Permit has been reviewed, work controls are in place and site is ready for job.)			
Name:	Signature:	Life#:	Date:

6. Departmental Job Supervisor, Work Requester/Designee determines if Post Job Review is required. ☐ Yes ☐ No

Post Job Review (Fill in names of reviewers)			
Name:	Signature:	Life#:	Date:
Name:	Signature:	Life#:	Date:

7. Worker provides feedback.

Worker Feedback (use attached sheets as necessary)
a) WCM/WCC: Is any feedback required? ☐ Yes ☐ No

b) Workers: Are there better methods or safer ways to perform this job in the future? ☐ Yes ☐ No

8. Closeout: Work Control Coordinator (authorizing dept.) checks quality of completed permit and ensures the work site is left in an acceptable condition. (WCC can delegate clean up of work area to work supervisor)

Name:	Signature:	Life#:	Date:
Comments:			

Attachment to W.P. #DRL-2012-01 January 17, 2012

DC E and W repairs in the PHENIX Experimental Hall (bldg. 1008).

Problem

Several gas leaks on the upper portions of the PHENIX Drift Chamber (DC) East and West detector arrays have been detected, necessitating repair efforts to seal the leaks. These leaks appear to be related to wire chamber repairs undertaken late last year. In addition, electronics faults at the front end modules (FEMs) for the DC detectors have been detected and require troubleshooting of the electronics connectors, boards and cables. The techniques to affect both of these repairs have been well established by the DC group experts and are handled as worker-planned work within the guidelines of the PHENIX Awareness training.

Access to the leaks, which are high on the east and west DC chambers requires use of a stationary stable scissor type manlift for the east and use of the CM lift table for the west. Access to the FEMs requires the use of multiple fixed ladders and fall protection.

The procedure by which this repair will be accomplished is provided below.

Work Plan

This work is to be done by fully trained and experienced personnel (PHENIX mechanical and electrical technicians and DC expert scientists) during the early stages of Run 12 prior to physics running.

1. Preparation for leak repairs

- persons performing this work shall have PHENIX Awareness training, CA access training, BNL ladder training, manlift training (if working in manlift)and BNL working at heights training (if working in manlift) and basic electrical safety.

- prior to commencing work the EC shall have been moved into the open position with the IR.

2. Leak repairs

- PHENIX technicians and DC experts shall access the regions of the DC east and west by CM lift table.

- DC experts and PHENIX gas system experts shall carefully determine the locations of all significant leaks using appropriate gas sensing detectors.

- The DC membrane shall be sealed with mylar tape at the locations of all detected leaks.

- After all repairs have been made, gas shall be restored to the DC chambers as determined by DC experts. (Note: gas mixture shall be non-flammable).

3. PHENIX gas system experts shall perform appropriate additional leak checks to determine the final leak rate and verify that the rate is within the allowable envelope for the DC subsytems and the entire PHNIX system.

- If problems are encountered DC experts and PHENIX techs shall repeat step 2 until gas system experts determine that no additional repairs are warranted and/or feasible.

4. FEM troubleshooting and repair

Access to the power supply modules is by extension ladders set up between the central magnet (CM) outrigger and the RICH vessel on the west carriage. For the higher modules, two ladders will be secured side-by-side, tied together, to allow climbing by the CM pole piece. As flammable gas is not flowing anywhere in the IR during summer shutdown periods, there is no danger of a flammable gas mishap, and the location of the repairs is far enough removed from the DC, PC, or TEC gas windows that there is no chance of damage to the gas volume from their installation. The Drift Chamber high and low voltage will be turned off. The 12-ton building crane will be positioned such to place the eye of a sling directly above the work area, then locked out. A harness will be worn and clipped to the sling while the work is being performed. A watch must be present at all times when someone is up on the ladders. All work in the IR will be supervised by Carter Biggs.

Work will involve trouble shooting of the modules and cables, and repair or replacement as appropriate.

- Ensure that power to the DC electronics is secured and that the CM power key is locked out of use.
- Erect and secure 1 (or 2 side by side if necessary) extension ladders between the top of the central magnet outrigger and the rich detector.
- Set up a tie off point just above the working position using the building crane and an adequately rated sling.
- The position of the tie off point is to be set for each working level and the crane must be locked out before the worker ascends the ladder.
- The worker is to use a body harness with a short clip-on lanyard and tie off before starting work.

- A watch person must be present at all times when a person is on the ladders
- Remove or reinstall power supply modules as necessary.

5. Post repairs work closeout

   After all repairs and tests are completed, The DC east and/or west shall be restored to its normal operating position (if necessary) on the DC support rails.

   Any lessons learned, problems encountered and their solutions should be recorded in the appropriate section of the work permit to which this procedure is attached.